

REMARKS

Further consideration of this application courteously is solicited.

By this paper, independent claims 9, 38, and 67 are amended to further clarify differences over the alleged prior art.

As amended, independent claims 9, 38, and 67 recite a particular alignment, on opposite sides of the circuit board, between the LD chip and/or PD chip located on the bench (on top of the circuit board), and an electric element such as the recited APC IC mounted to the bottom of the circuit board. To ensure full understanding of the significance of the claim amendments, reference is made to Applicants' preferred, exemplary embodiments.

Claim 9 reads on Applicants' Embodiment 4 as shown in Figures 12 through 14 of their drawings. In Figures 12 and 13, the bench 43 is seen as mounted on the topside of the circuit board 40. On the top of the bench 43, LD 30 and PD 29 are seen in alignment with optical fiber 31. As best seen from Figure 13, the auto power controlling IC (APC IC) is mounted to the underside of circuit board 40, at a position in opposition to LD 30. This is what the last paragraph of amended claim 9 has been made to emphasize, namely that "one of the electric elements on the bottom or the APC IC is mounted below and in opposition to the LD chip, through the circuit board and the bench."

We make the same comparison between independent claim 38 and Applicants' exemplary Embodiment 5 as shown in Figure 15. The last paragraph in claim 38 recites that "one of the electric elements on the bottom, the wave reforming IC, the time-adjusting IC or the buffer IC is mounted below and in opposition to the PD chip, through the circuit board and the bench." Indeed, in Figure 15, main amplifier 53 (which the specification describes as including a wave reforming IC, a timing regulating IC and a buffer) is mounted to the bottom of circuit board 40,

in direct opposition to PD 34 on bench 43 and board 40. (In the Figure 15 embodiment, there is no LD.)

Independent claim 67 combines features from claims 9 and 38 discussed above. It recites the APC IC as mounted on the lower surface of a first circuit board, in opposition to an LD chip (through the first circuit board and a first silicon bench), and at least one IC from a second group of IC's as mounted on the under surface of a second circuit board in opposition to a PD chip (through the second circuit board and a second silicon bench). The asserted art of record, whether considered individually, or in combination does not teach or suggest Applicants' optical communication device arrangements as now set forth in independent claims 9, 38, and 67.

Applicants' arrangements optimize the use of space in such a communication device. In particular, Applicants' claimed arrangements make use of the lower surface of the circuit board by requiring that an IC be mounted directly beneath the LD or the PD located on the top of the board. In this way, Applicants' arrangements have shortened significantly the wiring lengths between the electrical elements. According to Applicants, reduction of the wiring lengths promotes higher speed response in the LD, PD, or LD/PD elements. In this regard, Applicants point out page 6, lines 23-25 of their specification that describe a purpose of their invention as providing a downsized optical communication device (optoelectronic elements LD, PD, LD/PD) and electronic elements having short lengths, and small widths and thicknesses. Similarly, at page 8, lines 17-25, Applicants describe that exploitation of the bottom of the circuit board enables the optical communication module to have an increased number electronic and electric elements. The increment of increase allows the module to incorporate complementary electronic and electric elements that otherwise would be located at a remote distance from the board and

module. Access to such elements allows connection between the optical and electronic elements with very short wires, as compared with conventional devices. As mentioned above, reducing the length of the wiring improves high speed performance. This is due to reduction in inductance L and resistance R in the wiring. Also, Applicants employ short wires to act to shield the module from noise.

Applicants understand Kim to disclose an optical communication device comprising a circuit board having a top surface and a bottom surface (inherent), a bench mounted on the top surface of the circuit board, a laser diode (LD) chip mounted on the bench for generating transmitting light signals, a monitoring photodiode (PD) chip mounted on the bench for monitoring the power of the laser diode, light guides aligned with the laser diode on the bench for guiding light signals from the laser diode, and an LD-driving IC mounted on the circuit board for operating the optoelectronic elements. They recognize Kim as further teaching that the light guide is an optical fiber with a ferrule, and that the bench has a V-groove for supporting the fiber.

Applicants view Ochiai as proposing an optical link module having a silicon substrate 18, larger and smaller V-grooves 18a and 18b formed on the silicon substrate 18, an optical fiber 16a, and a ferrule 16 (for example, in Figure 4). The two-stepped V-groove is denoted. The larger V-groove sustains the ferrule and the smaller V-groove sustains the fiber. Ochiai is understood as cited for the reason of the two-stepped V-groove.

Applicants focus on Ozeki. According to Applicants, Ozeki teaches an optical bus system having a rectangular, transparent optical bus 20, a plurality of daughter boards 40, LD/PD/repeaters 42 and electronic circuits 41. The LD/PD/repeaters 42 are mounted on the top

of each daughter board 40, in contact with the optical bus 20. Electric circuits 41 also are located on the top of the boards. Other electric circuits 41 are mounted to the bottom of each daughter board.

It is important to note that Ozeki has daughter boards with electric circuits on both surfaces thereof, and the LD/PD/repeaters on top. However, Ozeki has no bench. The daughter boards are not benches. Rather, they correspond to circuit boards in Applicants' arrangements. This means that Ozeki lacks the bench.

With regard to amended claims 9, 38, and 67, Kim is not seen to teach or suggest Applicants' recited alignment of the LD/PD on the bench on the top of the circuit board with any particular circuit mounted to the underside of the board. Indeed, Kim is understood as completely silent with respect to any arrangement of components on the underside of the board, let alone any underside component arranged at a particular place underneath the board, in opposition to an LD/PD mounted (on the bench) on top the board. Neither Ochiai nor Ozeki remedies this deficiency of Kim with respect to the independent claims. Ochiai was cited in connection with the teaching of relatively larger and smaller V-shaped grooves. Ozeki, while showing circuits 41 mounted to the undersides of daughter boards 40, does not teach or suggest alignment of any particular such circuit with either the LD 42a or the PD 42b mounted to the top of any daughter board. For at least these reasons, Applicants courteously submit that Kim, Ochiai, or Ozeki, whether considered individually, or in combination, fail to teach or suggest Applicants' communication device arrangements as now described in claims 9, 38, and 67. Hence, the rejection of all of claims 9-14, 38-43, and 67-69 over Kim, Ozeki et al., and Ochiai et

al., as applied in the February 7, 2006 Office Action, is traversed. Withdrawal of this rejection courteously is solicited.

For at least the reasons stated above, the asserted combination of Kim, Ochiai, and Ozeki fails to teach or suggest Applicants' claimed arrangements. Moreover, it is submitted that the asserted combination improperly is based upon hindsight.

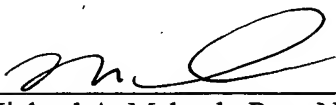
The position of the bench is significant in Applicants' claimed arrangements. However, Ozeki has no bench. If those of ordinary skill in the art were to include a bench in Ozeki, such bench would have to be between the transparent rectangular optical bus and the LD/PD/repeater. However, if such a bench were sandwiched between the optical bus and the LD/PD/repeater, the Ozeki system would be inoperative. A bench simply cannot be incorporated in Ozeki, but the same is essential to Applicants. If Ozeki were to include a bench, Ozeki's system would fail. For at least this reason, there is no motivation for combining Ozeki with Ochiai and Kim. The asserted combination makes Ozeki inoperative. Hence, the asserted combination improperly relies upon hindsight, and should be withdrawn.

Applicants respectfully submit that this Amendment and the above remarks obviate the outstanding rejections in this case, thereby placing the application in condition for immediate allowance. Allowance of this application is earnestly solicited.

If any other fees under 37 C.F.R. §§1.16 or 1.17 are due in connection with this filing,
please charge the fees to Deposit Account No. 02-4300; Order No. 033035 M 086.

Respectfully submitted,
SMITH, GAMBRELL & RUSSELL, LLP

By: _____


Michael A. Makuch, Reg. No. 32,263
1850 M Street, N.W., Suite 800
Washington, D.C. 20036
Telephone: (202)263-4300
Facsimile: (202) 263-4329

Date: May 4, 2006